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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,166	11/25/2003	Shibly S. Ahmed	H1102C	4327
45114	7590	10/19/2005		
HARRITY & SNYDER, LLP 11240 WAPLES MILL ROAD SUITE 300 FAIRFAX, VA 22030			EXAMINER WILCZEWSKI, MARY A	
			ART UNIT 2822	PAPER NUMBER

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/720,166

Applicant(s)

AHMED ET AL.

Examiner

M. Wilczewski

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2005 and 10 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37-55 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 37-55 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10 Aug 2005</u> . | 6) <input checked="" type="checkbox"/> Other: <u>See Continuation Sheet</u> . |

Continuation of Attachment(s) 6). Other: IDSs filed 04 May 2005; 03 Dec 2004; 26 May 2004; 30 Jan 2004; 08 Jan 2004.

DETAILED ACTION

Election/Restrictions

Pending claims 37-55 are drawn to a semiconductor device and have been examined herein.

Drawings

The drawings filed on 25 November 2003 are acceptable.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 37, 38, 39, and 41-44 rejected under 35 U.S.C. 102(e) as being anticipated by Fried et al., U.S. Patent 6,583,469.

Fried et al. disclose a semiconductor device (shown in figures 16A, 16B, 17A, 17B, 18A and 18B) which comprises a substrate 10b, an insulating layer 10u formed on the substrate, a conductive fin of silicon 12 formed on the insulating layer including a plurality of side surfaces and a top surface (Figure 18B), a source region and a drain region (regions 36 shown in Figure 18A) formed on the insulating layer and adjacent a first and second end of the fin, and a metal gate 32 formed on the insulating layer

Art Unit: 2822

adjacent the fin in a channel region of the device (col. 6, lines 39-52, and col. 3, line 55, bridging col. 4). Fried et al. disclose that gate dielectric materials such as nitrides and oxynitrides can be used, see col. 6, lines 30-40. These materials have high dielectric constants.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 52-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fried et al., U.S. Patent 6,583,469.

Claims 40 and 48-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fried et al., U.S. Patent 6,583,469.

Fried et al. disclose a semiconductor device (shown in figures 16A, 16B, 17A, 17B, 18A and 18B) which comprises a substrate 10b, an insulating layer 10u formed on the substrate, a conductive fin of silicon 12 formed on the insulating layer including a plurality of side surfaces and a top surface (Figure 18B), a source region and a drain region (regions 36 shown in Figure 18A) formed on the insulating layer and adjacent a first and second end of the fin, and a metal gate 32 formed on the insulating layer adjacent the fin in a channel region of the device (col. 6, lines 39-52, and col. 3, line 55, bridging col. 4). Fried et al. disclose that gate dielectric materials such as nitrides and

oxynitrides can be used, see col. 6, lines 30-40. These materials have high dielectric constants.

In column 6, lines 39-52, Fried et al. disclose that gate electrode 32 comprises any conventional conductor including metals, metal alloys, silicides and doped polysilicon. Although Fried et al. do not expressly disclose that tantalum, tantalum nitride, titanium or titanium nitride are used to form gate 32, these materials would have been obvious to one skilled in the art, since these metals and metal alloys are conventionally used in the art to form gate electrodes.

It is also noted that Fried et al. do not disclose the thickness of oxide layer 10u. However, the thickness of this layer is deemed an obvious processing parameter to be optimized by the skilled artisan. Optimization of the thickness of oxide layer 10u of Fried et al. would not require undue experimentation by one of ordinary skill in the art.

Claims 39 and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fried et al., U.S. Patent 6,583,469 as applied to claims 39 and 41 above, and further in view of Yeo et al., U.S. Patent 6,855,990.

Fried et al. is applied as above. Although Fried et al. disclose using gate dielectric materials having high dielectric constants, for example, nitride and oxynitride, Fried et al. lack anticipation of using a material comprising hafnium to form the gate dielectric layer. Yeo et al. discloses a semiconductor device having a fin formed of semiconductive material with an overlying gate in which the gate dielectric layer comprises a high dielectric constant material such as hafnium oxide, see figure 2 and col. 3, lines 20-39, and col. 7, lines 4-15. It would have been obvious to one skilled in

the art to substitute a material comprising hafnium for the gate dielectric layer of Fried et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Wilczewski whose telephone number is (571) 272-1849. The examiner can normally be reached on Monday and Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



M. Wilczewski
Primary Examiner
Tech Center 2800